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10/517,377	12/10/2004	Takayuki Furuta	043082	4713

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EXAMINER	
JEN, MINGJEN	

ART UNIT	PAPER NUMBER
3664	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/517,377	FURUTA ET AL.	
	Examiner	Art Unit	
	IAN JEN	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *1* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/10/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is response to the amendment filed on January 17,2008

2. Claims, 1, 5, 6, 9 have been amended.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takenaka et al (US Pat No 5357433) in view of Yamajima (US Pat No 3655003).

As for claim 1, Takenaka et al shows a walking mobile system comprising: foot portion (Fig 1, 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), a main body having at both sides of its lower part a plurality of leg portions attached thereto so as to be each pivotally movable biaxially (Fig 1; Col 2, lines 66 - Col 3, liens 21), each of the leg portions having a knee portion in its midway and a foot portion at its lower end (Fig 1, 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), the foot portions being attached to their corresponding leg portions so as to be pivotally movable biaxially (Fig 1, 18R,18L, 20R, 20L, 22R, 22L; Col 3, lines 10-14), drive means for pivotally moving respective leg, knee, and foot portions (Col 3, lines 1-2 where drive

means are electric motors), a gait forming part for forming gait data including target angle path, target angle velocity, and target angle acceleration corresponding to a required motion(Abstract, where gait is generated such that a ZMP kinematically from the motion of the robot) , and a walk controller for drive-controlling the drive means based on the gait data (Fig 1, Control unit 26; Fig 2, CPU 60; Col 4, lines 2-5), characterized in that, the walk controller comprises force sensors for detecting forces applied to soles of respective foot portions (Col 3, lines 35 - 58) , and a compensation part for adjusting the gait data from the gait forming part based on horizontal floor reaction force among the forces detected by the force sensors (Col 4, lines 59- Col 4, lines 9), the force sensors are provided to regions, respectively, divided into a plurality at the soles of respective foot portions (Col 3, lines 44 - 45), the force sensors provided to the regions next to end edges of respective soles detect a contact of foot sides(Col 3, lines 44 - 45), and the compensation part adjusts the gait data from the gait forming part, referring to the contact of foot sides (Fig 2, D/A 66, Servo amplifier, encoder/motor; Col 3, lines 59 - Col 4, lines 9 where the each servo amplifier connects to encoder/motor), Takenaka et al does not show an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

Yamajima shows an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

As for claim 2, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and at least a part of a outer edge of the sole as a detection part of the corresponding force sensor (Fig 5; Col 5, lines 40-45), in the region next to the end edges of the respective soles (Fig 5, Col 5, lines 40 - Col 6, lines 35), forms a circular arc plane with the force sensor as the center(Fig 5, Col 5, lines 40 - Col 6, lines 35 where the circular arch plane is the robotic feet with sensor distributed around the feet including center).

As for claim 3, Takenaka et al shows the force sensor is a 3-axis force sensor, and the compensation part comprises a hexaxial force computing part for computing forces in the hexaxial direction based on detected signals from respective force sensors (Fig 4, E0, E1,E2 coordinates, X,Y,Z directions; Col 4 lines 35 - Col 5, lines 43), and a contact detection part for detecting the contact of a foot side by a decomposition of force components (Fig 5, dx dy; Col 5 4- 34).

As for claim 4, Takenaka et al shows the contact detection part judges if the detected signals from respective force sensors are forces from a floor surface, or by the contact to a matter on the floor surface (Fig 4, Fig 5; Col 5, lines 5 - 35), and outputs flag information as to which force sensor detected the contact of a foot side to the compensation part (Fig 5; Col 1, lines 23 - 40 where convex polygon is distributed by force sensors, which connects to the control unit 26; Col 3, lines 59 - Col 4, lines 10).

As for claim 5, Takenaka et al shows a main body having at both sides of its lower part a plurality of leg portions attached thereto so as to be each pivotally movable biaxially (Fig 1; Col 2, lines 66 - Col 3, liens 21), each of the leg portions having a knee portion in its midway and a foot portion at its lower end (Fig 1, 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), the foot portions being attached to their corresponding leg portions so as to be pivotally movable biaxially (Fig 1, 18R,18L, 20R, 20L, 22R, 22L; Col 3, lines 10-14) , and drive means for pivotally moving respective leg, knee, and foot portions (Col 3, lines 1-2 where drive means are electric motors), the walk controller drive-controls the drive means in accordance with gait data including target angle path, target angle velocity, and target angle acceleration formed from a gait forming part corresponding to a required motion (Abstract, where gait is generated such that a ZMP kinematically from the motion of the robot; Fig 1, Control unit 26; Fig 2, CPU 60; Col 4, lines 2-5), as well as comprises force sensors to detect forces applied to a sole of each foot portion (Col 3, lines 35 - 45), and a compensation part to adjust the gait data from the gait forming part based on horizontal floor reaction force among the forces detected by the force sensor (Fig 2, Fig 4; Col 3, lines 59 - Col 4, lines 40), characterized in that, the force sensors are provided to regions, respectively, divided into a plurality at the soles of respective foot portions (Fig 2, Fig 4; Col 3, lines 59 - Col 4, lines 40), the force sensors provided to the regions next to end edges of respective soles detect a contact of foot sides sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55; Fig 5; Col 5, lines 40-45), and the compensation part adjusts the gait data from the gait forming part, referring to the contact of foot sides (Fig 2, D/A 66, Servo amplifier, encoder/motor; Col 3, lines 59 - Col 4, lines 9 where the each servo amplifier connects to encoder/motor). Takenaka et al does not show an upper sole and a lower

sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

Yamajima shows an upper sole and a lower sole (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40), and the force sensor is provided between the upper sole and the lower sole (Col 2, lines 5 – Col 3, lines 30; Fig 2, Abstract; where the weight machine is the force sensor), and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40).

It would have been obvious for one of ordinary skill in there art, to provide the force sensor mechanism, as taught by Yamajima, to Takenaka et al, in order to provide a force detecting means for the force exerted on the robot foot.

As for claim 6, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and at least a part of a outer edge of the sole as a detection part of the corresponding force sensor (Fig 5; Col 5, lines 40-45), in the region next to the end edges of the respective soles (Fig 5, Col 5, lines 40 - Col 6, lines 35), forms a circular arc plane with the force sensor as the center (Fig 5, Col 5, lines 40 - Col 6, lines 35 where the circular arch plane is the robotic feet with sensor distributed around the feet including center). Takenaka et al does not show an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

Yamajima shows an upper sole and a lower sole (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40), and the force sensor is provided between the upper sole and the lower sole (Col 2, lines 5 – Col 3, lines 30; Fig 2, Abstract; where the weight machine is the force sensor), and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40).

It would have been obvious for one of ordinary skill in the art, to provide the force sensor mechanism, as taught by Yamajima, to Takenaka et al, in order to provide a force detecting means for the force exerted on the robot foot.

As for claim 7, Takenaka et al shows the he force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and the compensation part comprises a hexaxial force computing part for computing forces in the hexaxial direction based on detected signals from respective force sensors (Fig 4, E0, E1,E2 coordinates, X,Y,Z directions; Col 4 lines 35 - Col 5, lines 43), and a contact detection part for detecting the contact of a foot side by a decomposition of force components (Fig 5, dx dy; Col 5 4- 34).

As for claim 8, Takenaka et al shows the contact detection part judges if the detected signals from respective force sensors are forces from a floor surface (Fig 4, Fig 5; Col 5, lines 5 - 35), or by the contact to a matter on the floor surface, and outputs flag information as to which force sensor detected the contact of a foot side to the compensation part (Fig 5; Col 1, lines 23 -

40 where convex polygon is distributed by force sensors, which connects to the control unit 26; Col 3, lines 59 - Col 4, lines 10).

As for claim 9, Takenaka et al shows a walk control method for a walking mobile system comprising a main body having at both sides of its lower part a plurality of leg portions attached thereto so as to be each pivotally movable biaxially (Fig 1; Col 2, lines 66 - Col 3, liens 21; 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), each of the leg portions having a knee portion in its midway and a foot portion at its lower end (Fig 1; Col 2, lines 66 - Col 3, liens 21; 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), the foot portions being attached to their corresponding leg portions so as to be pivotally movable biaxially (Fig 1, 18R,18L, 20R, 20L, 22R, 22L; Col 3, lines 10-14), drive means for pivotally moving respective leg, knee, and foot portions (Col 3, lines 1-2 where drive means are electric motors), the walk control method including drive-controlling the drive means based on gait data including target angle path, target angle velocity, and target angle acceleration formed from a gait forming part corresponding to a required motion (Abstract, where gait is generated such that a ZMP kinematically from the motion of the robot), as well as detecting forces applied to a sole of each foot portion(Fig 4, Fig 5; Col 3, lines 35 - 58), and also adjusting the gait data from the gait forming part by a compensation part based on horizontal floor reaction force among forces detected by force sensors (Fig 4, Fig 5; Col 4, lines 59- Col 4, lines 9), characterized in that it includes, a first step to detect the forces by respective force sensors in regions divided into a plurality at the soles of respective foot portions (Col 3, lines 44-45), a second step to detect a contact of respective foot sides by detected signals from the force sensors provided to the regions next to end edges of

respective soles (Col 3, lines 44-45), and a third step to adjust the gait data from the gait forming part by the compensation part, referring to the contact of foot sides (Fig 2, D/A 66, Servo amplifier, encoder/motor; Col 3, lines 59 - Col 4, lines 9 where the each servo amplifier connects to encoder/motor). Takenaka et al does not show an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

Yamajima shows an upper sole and a lower sole (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40), and the force sensor is provided between the upper sole and the lower sole (Col 2, lines 5 – Col 3, lines 30; Fig 2, Abstract; where the weight machine is the force sensor), and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40).

It would have been obvious for one of ordinary skill in the art, to provide the force sensor mechanism, as taught by Yamajima, to Takenaka et al, in order to provide a force detecting means for the force exerted on the robot foot.

As for claim 10, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and at least a part of a outer edge of the sole as a detection part of the corresponding force sensor (Fig 5; Col 5, lines 40-45), in the region next to the end edges of the respective soles (Fig 5, Col 5, lines 40 - Col 6, lines 35), forms a circular arc plane with the force sensor as the center (Fig 5, Col 5, lines 40 - Col 6,

lines 35 where the circular arch plane is the robotic feet with sensor distributed around the feet including center).

As for claim 11, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and the compensation part comprises a hexaxial force computing part for computing forces in the hexaxial direction based on detected signals from respective force sensors (Fig 4, E0, E1,E2 coordinates, X,Y,Z directions; Col 4 lines 35 - Col 5, lines 43), and a contact detection part for detecting the contact of a foot side by a decomposition of force components (Fig 5, dx dy; Col 5 4- 34).

As for claim 12, Takenaka et al shows the contact detection part judges if the detected signals from respective force sensors are forces from a floor surface, or by the contact to a matter on the floor surface (Fig 4, Fig 5; Col 5, lines 5 - 35), and outputs flag information as to which force sensor detected the contact of a foot side to the compensation part (Fig 5; Col 1, lines 23 - 40 where convex polygon is distributed by force sensors, which connects to the control unit 26; Col 3, lines 59 - Col 4, lines 10).

Response to Arguments

5. Applicant's argument with respect to claims 1-12 have been fully considered but are moot in view of the new grounds of rejection.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IAN JEN whose telephone number is (571)270-3274. The examiner can normally be reached on Monday - Friday 9:00-6:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoi Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ian Jen/
Examiner, Art Unit 3664
/Khoi H Tran/
Supervisory Patent Examiner, Art Unit 3664